

Low-power voltage repeater with $\pm 0,5$ % accuracy with low drop voltage

(FUNCTIONAL EQUIVALENT OF TLE4250 INFINEON)

ILE4250G, ILE4250S - are integrated circuits of low-power voltage repeater (adapter) with $\pm 0,5$ % accuracy, load capacity up to 50 mA and with low-drop voltage. ICs realized in 5-pin plastic packages ILE4250G - P-TO263-5-1, ILE4250S – P-TO220-5-12.

Integrated circuits of low-power voltage repeater (adapter) are purposed to transfer voltage with $\pm 0,5$ % accuracy (for load current 1...50mA) at a range of input voltages from 6 to 28 V, with $\pm 0,5$ % accuracy (for load current 1...10mA) at a range of input voltages from 6 to 40 V, and with $\pm 0,1$ % accuracy (for load current 1...10mA) at a range of input voltages from 6 to 16 V.

Drop voltage is less 0,3 at load current 10 mA. The ICs are tolerant to over voltage of both polarities (positive & negative). Adjustment pin input voltage ICs is in range from 2 to 36 V

The ICs are used in power supply units of electronic devices, especially in automotive electronics.

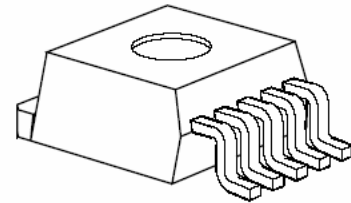


Fig. 1 – View of IC in P-TO263-5-1 package

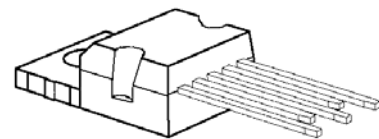


Fig. 2 – View of IC in P-TO220-5-12 package

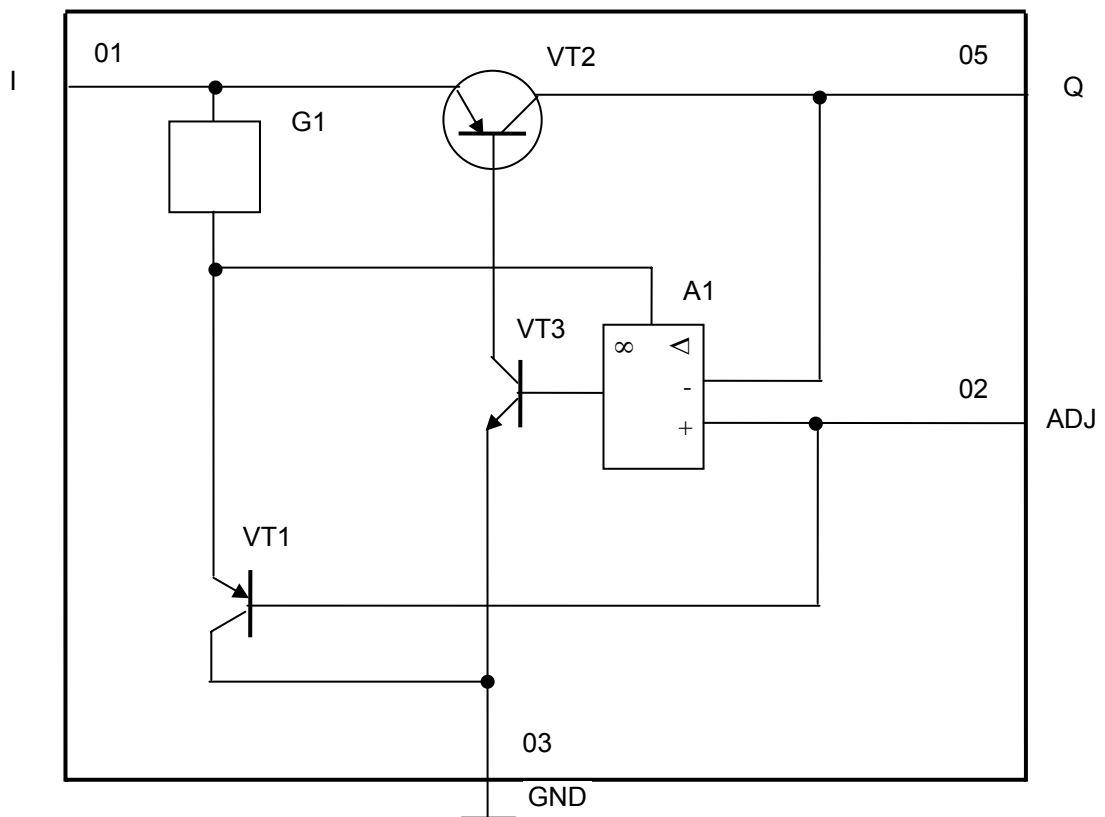
Main features

- High accuracy of the output voltage $\pm 0,5\%$;
- Low-drop voltage ;
- Built in overheating protection;
- Reverse polarity proof;
- Low consumption current;
- Input voltage from 3 to 40 V;
- Suitable for use in automotive electronics;
- Wide junction temperature range -40 ... +150°C;

Permissible value of ESD potential 1000V

Table 1 Pins description

Package pin number	Chip pad number	Symbol	Function
01	01	I	Input
02	02	ADJ	Adjustment/disable input
03	03	GND	Common pin (Ground)
04	-	NC	Not connected pin
05	04	Q	Output



A1 –amplifier;
 G1 – current source;
 VT1 – VT3 - transistors

Fig. 3 – Electric block diagram

Table 2 Absolute Maximum Ratings

Symbol	Parameters	Norm		Unit
		min.	max.	
T _J	Junction temperature	-40*	150	°C
T _{stg}	Storage temperature	-50	150	°C
U _I	Input voltage	-42	45	V
U _Q	Output voltage	-1**	40**	V
U _{ADJ}	Adjustment/disable pin voltage	-0,3**	40**	

* Ambient temperature is indicated.
 ** Voltage is not applied to input I

Table 3 – Recommended operation modes

Symbol	Parameter	Norm		Unit
		Min.	Max.	
T _J	Junction temperature	-40*	150	°C
U _I	Input voltage	3	40	V
U _{ADJ}	Adjustment/disable pin voltage	2	36	V

Note:

Maximum power P_{tot}, W, dissipated by IC at ambient temperature T_A, is calculated by formula:

$$P_{tot} = (150 - T_A) / R_{th\ j-a} , \quad (1)$$

150 – maximum permissible operating junction temperature, °C.

R_{th j-a} - thermal resistance junction ambient, °C /W,

for ILE4250G without heat sink R_{th ja} is equal 80 °C /W

for ILE4250S without heat sink R_{th ja} is equal 65 °C /W

for IC with heat sink R_{th ja} is calculated by formula

$$R_{th\ j-a} = R_{th\ j-c} + R_{th\ c-a} , \quad (2)$$

R_{th j-c} - thermal resistance junction case, °C /W. R_{th jc} = 4 °C/W.

Thermal resistance case-ambient R_{th c-a} is determined by heat sink design and is selected by IC customer.

Application circuit and heat sink and ambient temperature have to provide junction temperature not more T_J ≤ 150 °C.

* Ambient temperature is indicated.

Table 4 – Electric parameters

($U_I = 13,5 \text{ V}$, $U_{ADJ} > 2,0 \text{ V}$, $-40 \text{ °C} \leq T_J \leq 150 \text{ °C}$ unless otherwise specified)

Symbol	Parameter	Mode of measurement	Norm		Unit
			Min.	Max.	
ΔU_Q	Voltage repeating accuracy	$6 \text{ V} \leq U_I \leq 28 \text{ V}$ $-1 \text{ mA} \leq I_Q \leq -50 \text{ mA}$	- 0,5	0,5	%
		$6 \text{ V} \leq U_I \leq 40 \text{ V}$ $-1 \text{ mA} \leq I_Q \leq -10 \text{ mA}$	- 0,5	0,5	
		$6 \text{ V} \leq U_I \leq 16 \text{ V}$ $-1 \text{ mA} \leq I_Q \leq -10 \text{ mA}$	- 0,1	0,1	
U_{dr}	Drop voltage	$I_Q = -10 \text{ mA}$, $U_{ADJ} > 4.0 \text{ V}$ Note 2	-	0,3	V
I_q	Consumption current $I_q = I_I - I_Q$	$I_Q \leq -30 \text{ mA}$	-	3,0	mA
		$I_Q \leq -1 \text{ mA}$	-	0,15	
		$U_{ADJ} = 0 \text{ V}$, $T_J < 85 \text{ °C}$	-	0,02	
		$U_{ADJ} = U_I = 5 \text{ V}$, $I_Q = 0 \text{ mA}$	-	3,0	
I_{Qmax}	Maximum output current	$T_J \leq 125 \text{ °C}$ Note 2	50	-	mA
$\Delta U_{Q(U)}$	Supply (input) voltage regulation of output voltage	$6 \text{ V} \leq U_I \leq 40 \text{ V}$ $I_Q = -10 \text{ mA}$	-10	10	mV
$\Delta U_{Q(I)}$	Load current regulation of output voltage	$-1 \text{ mA} \leq I_Q \leq -30 \text{ mA}$	- 15	15	mV
Adjustment/disable input parameters					
I_{ADJ}	Adjustment/disable pin current	$U_{ADJ} = 5 \text{ V}$ $T_J < 125 \text{ °C}$	-	0,5	mA
$U_{ADJ \text{ off}}$	Adjustment /disable pin switching off voltage	IC is off $T_J < 125 \text{ °C}$	0,8	-	V
U_{ADJ}	Adjustment range	$ U_Q - U_{ADJ} < 0,5\%$, $U_I \geq U_Q + 0,3 \text{ V}$, $T_J < 125 \text{ °C}$	2,0	36	V
<p>Notes</p> <p>1. Measurement of electric parameters is processed with connected input capacities $C_{I1} = 100 \mu\text{F}$, and output capacity $C_Q = 2,2 \mu\text{F}$.</p> <p>2. Parameter is measured, when the output voltage V_Q has dropped 100 mV from the nominal value obtained at $U_I = 13.5 \text{ V}$.</p> <p>_____</p> <p>* Ambient temperature is indicated.</p>					



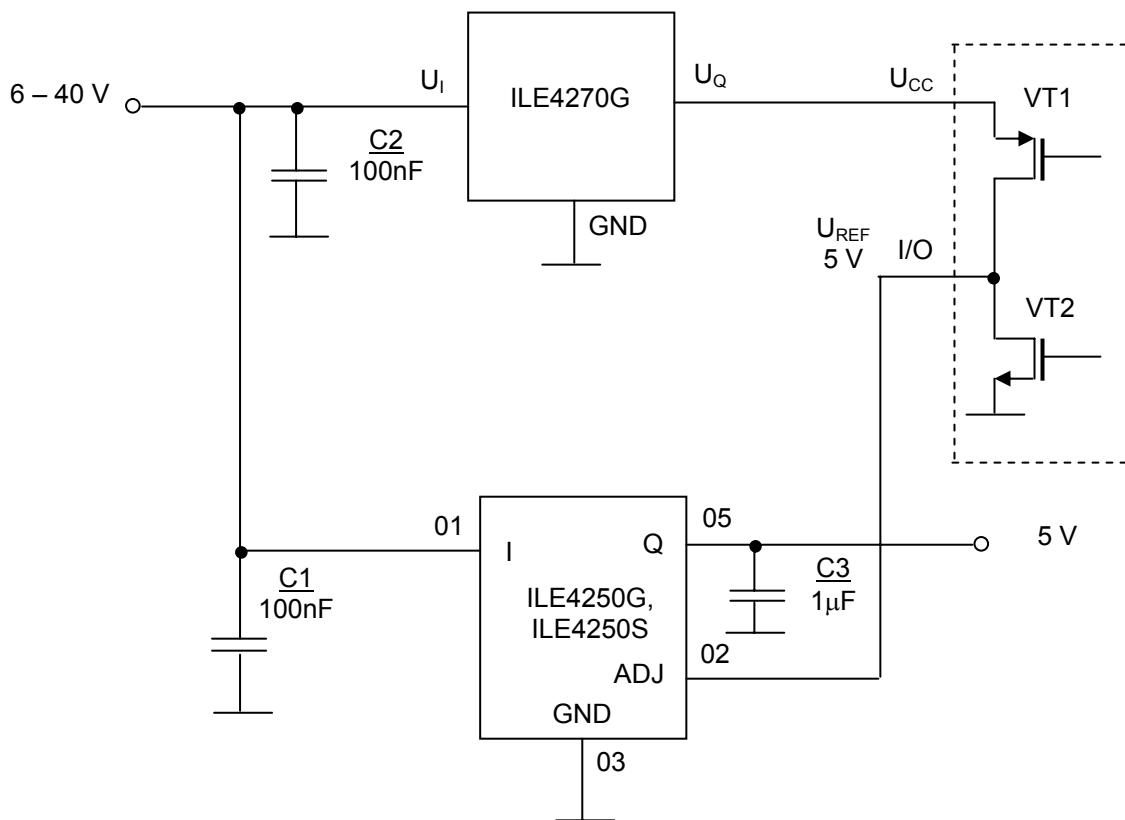
Table 5 – Typical electric parameters

($U_I = 13,5\text{ V}$, $U_{ADJ} > 2,0\text{ V}$, $-40\text{ °C} \leq T_J \leq 150\text{ °C}$ unless otherwise specified)

Symbol	Parameter	Mode of measurement	Typical value	Unit
PSRR	Ripple rejection ratio	$f_r = 100\text{ Hz}$, $I_Q = -100\text{ mA}$ $U_r = 0,5^{**}\text{ V (p - p)}$	60	dB

* Ambient temperature is indicated.

** It is permitted to measure at $U_{r(p-p)} = 3\text{ V}$, but for that PSRR norm to be revised



VT1, VT2 – transistors

Fig 4 – Typical application diagram

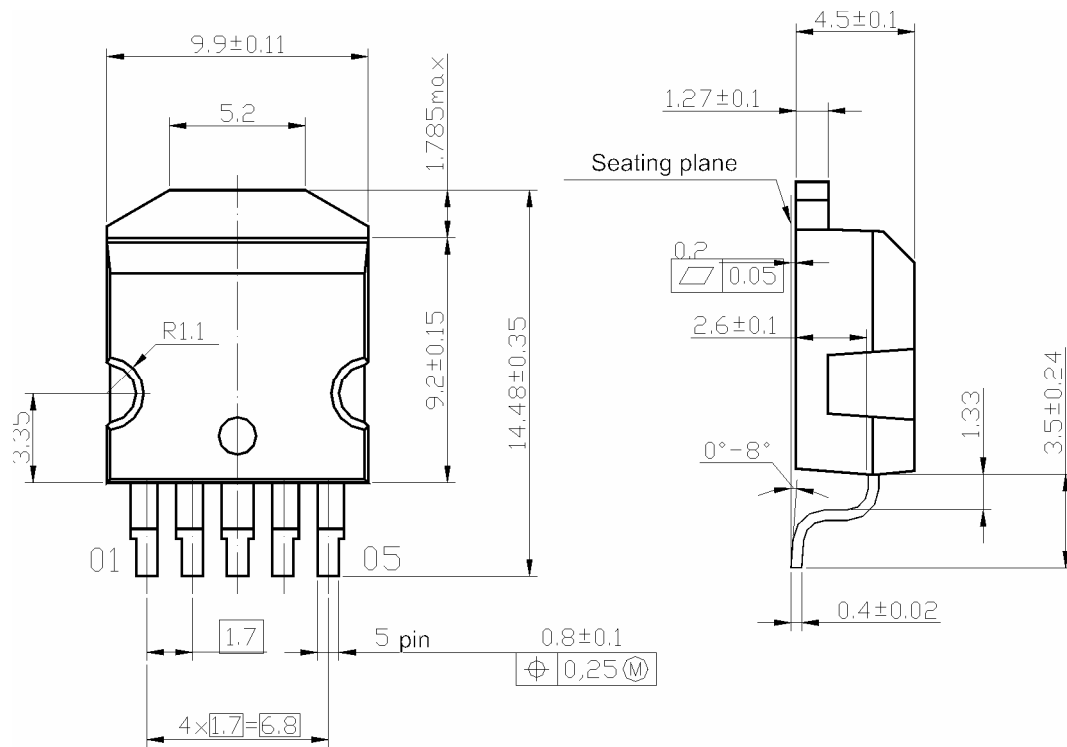


Fig 5 – P-TO263-5-1 package outline

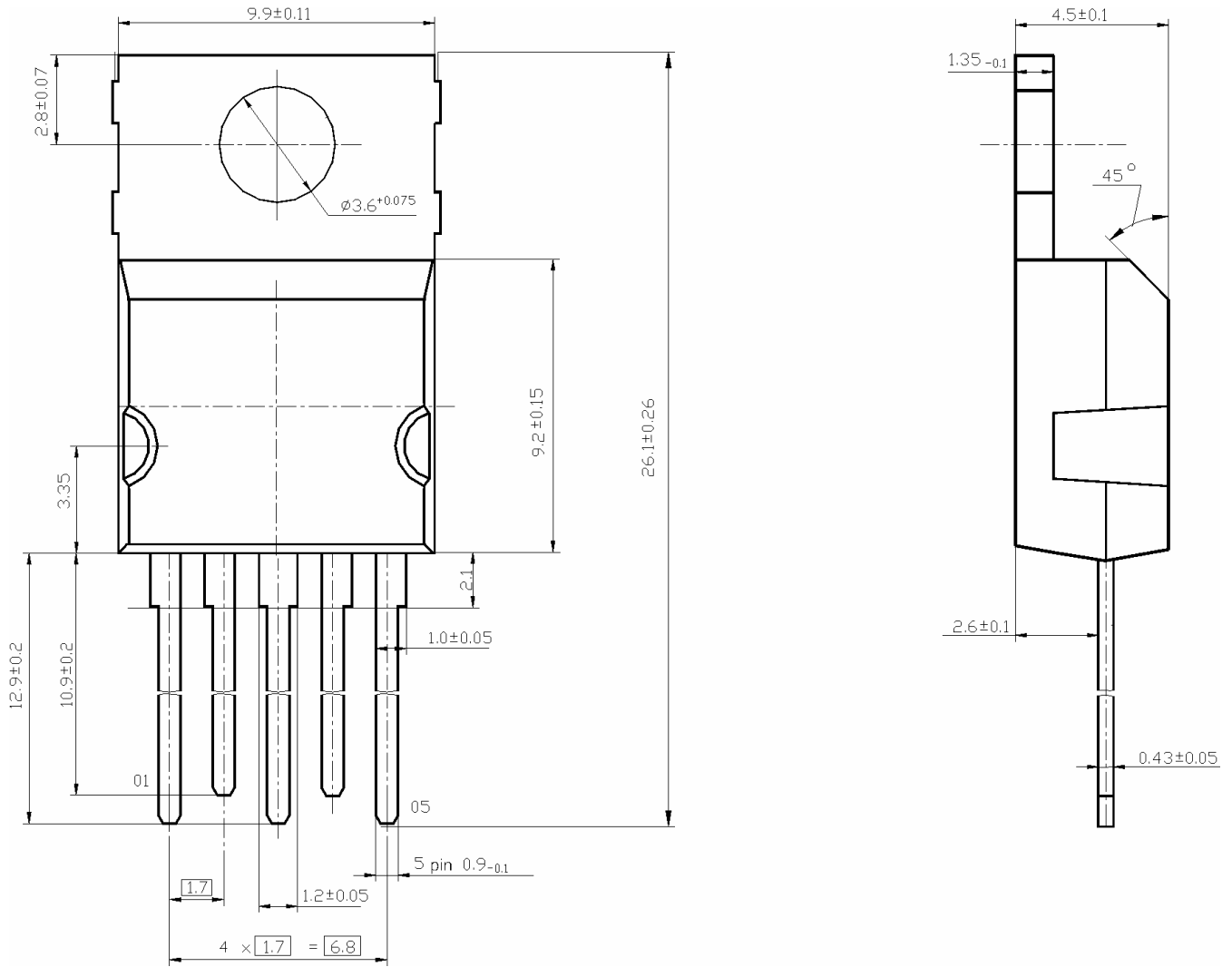
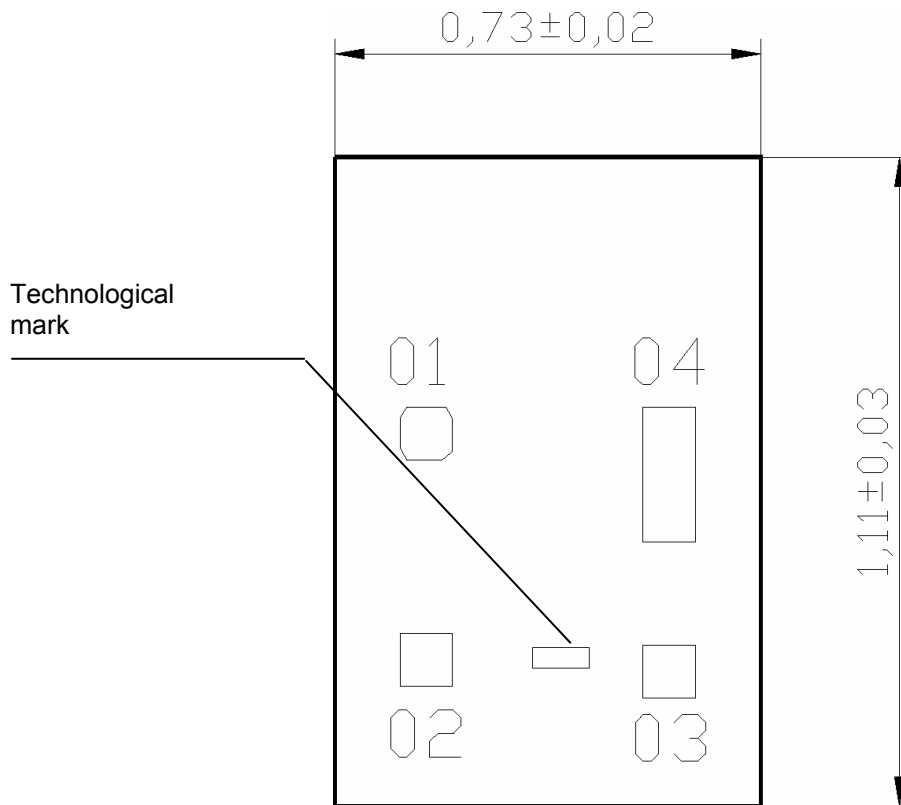


Fig. 6 – P-TO220-5-12 package outline



Contact pad coordinates are indicated in the table 6.

Technological mark on chip «4250.» has coordinates, mm: left bottom corner $x = 0,340$, $y = 0,210$.

Chip thickness is $0,35 \pm 0,02$.

Fig. 7– Chip outline drawing

Table 6 Contact pad location table

Contact pad number	Coordinates (Left bottom corner), mm	
	X	Y
01	0,112	0,593
02	0,112	0,206
03	0,528	0,186
04	0,528	0,453

Notes

- Coordinates and size of the contact pads are given by the layer «Passivation»
- Sizes of contact pads are
pads 01-03 - 0,090 x 0,090 mm,
pad 04 - 0,090 x 0,230 mm.
- Bevel of two corners of the first contact pad (24 ± 2) μm